

BIOLOGICAL OPINION SUMMARY
WHITE CANYON FIRE

Date of opinion: July 22, 1997

Action agency: Bureau of Land Management

Project: Emergency Fire Suppression of White Canyon Fire

Location: Pinal County, Arizona

Listed species affected: Southwestern willow flycatcher

Biological opinion: Nonjeopardy

Incidental take statement:

Anticipated take:

The Service anticipates four pair of southwestern willow flycatchers were taken as a result of this proposed action. The incidental take is expected to be in the form of harassment for one pair of birds each at two habitat patches which were within several hundred yards of water bucket fill sites, and two pair were taken through harassment from water drops at two habitat patches that were burning.

Reasonable and Prudent Measures and Terms and Conditions:

The Service provided BLM with reasonable and prudent measures for minimizing take of the southwestern willow flycatcher: use water from unoccupied areas, keep helicopters as far from occupied habitat patches as possible, and set no backfires, if possible.

Conservation recommendations: *Implementation of conservation recommendations is discretionary.*

- Preclude riparian areas from grazing activities after fire for two growing seasons.
- Block up riparian habitat in the Middle Gila drainage in Federal ownership.
- Remove limiting factors to southwestern willow flycatcher occupation and productivity in riparian areas.



United States Department of the Interior

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In Reply Refer To:
AESO/SE
2-21-95-F-356

July 22, 1997

MEMORANDUM

TO: Field Manager, Phoenix Field Office, Bureau of Land Management, Phoenix, Arizona

FROM: Field Supervisor

SUBJECT: Emergency Consultation on White Canyon Fire

The U.S. Fish and Wildlife Service has reviewed the biological assessment for the emergency fire suppression activities related to the White Canyon Fire located in Pinal County. Your July 12, 1995, request for formal consultation was received on July 13, 1995. This document represents the Service's biological opinion on the effects of that action on (species) in accordance with section 7 of the Endangered Species Act of 1973, as amended, (16 U.S.C. 1531 et seq.).

This biological opinion is based on information provided in the July 12, 1995, biological assessment, telephone conversations with Tim Hughes, and other sources of information. Literature cited in this biological opinion is not a complete bibliography of all literature available on the species of concern, fire, fire fighting and its effects, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file in this office.

It is the Service's biological opinion that the fire suppression, as conducted, is not likely to jeopardize the continued existence of the southwestern willow flycatcher. No critical habitat has been designated for this species, therefore, none will be affected.

CONSULTATION HISTORY

A wildfire started on June 24, 1995, at approximately noon, in the vicinity of Cochran, Arizona at T. 4S., R. 12E., Sec. 5. Phoenix District BLM assumed responsibility for fire suppression at approximately 5:00 p.m. The Service was notified shortly thereafter that southwestern willow flycatcher habitat might be affected and discussions ensued as to proper precautions and avoidance that could be worked into the suppression operation. Within 10 working days of containment, BLM submitted its biological assessment and request for formal consultation. The Service was unable to complete the consultation until now due to other higher priority actions taking precedence.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

A wildfire started on June 24, 1995, at approximately noon in the vicinity of Cochran at T. 4 S., R. 12 E., Sec. 5 (see attached map). Initial fire suppression actions were taken by the Arizona State Land Department. The fire escaped initial attack efforts and was determined by the State to be on Bureau of Land Management (BLM) administered lands. The Phoenix District BLM was notified of the fire at approximately 5:00 p.m. at which time they assumed responsibility for fire suppression efforts. At approximately 5:30 p.m., fire management personnel were notified that the fire was likely impacting occupied southwestern willow flycatcher habitat by BLM wildlife biologists and efforts were taken to limit the fire spread in the riparian corridor. A biologist was placed on the Incident Command Team as a Resource Advisor to assist in protection of the southwestern willow flycatcher.

The wildfire was burning out of control along the Gila River in the vicinity of Cochran. The fire was destroying valuable riparian habitat adjacent to the Gila River. The riparian area along the Gila River is important habitat for endangered southwestern willow flycatcher (*Empidonax traillii extimus*) and numerous other neotropical migratory birds. Fire suppression actions were determined necessary to limit the destruction of southwestern willow flycatcher habitat.

During the morning of June 25th, heavy air tanker fire retardant drops were made along the south side of the river in an attempt to limit the fire movement upstream along the river corridor and on the north side of the river where the fire had jumped the river. Three of the retardant drops were made within the riparian corridor. These efforts were successful in stopping the fire along the river and changed the direction of fire spread to the southeast.

Helicopters were used as a follow-up to the air tankers. The helicopters used buckets suspended below to drop water on actively burning areas on the north and south sides of the river. Helicopter bucket dip sites were designated by the BLM resource adviser in the river between known occupied southwestern willow flycatcher habitat patches and where all bankline riparian vegetation had been destroyed by the fire. The helicopter landing area was located several miles away from the river. Helicopter pilots were informed of the sensitive nature of the flycatcher habitat and told to avoid unnecessary low level flying in the vicinity of the river. They were told to approach bucket dip sites at a 90 degree direction to minimize flight time over the river corridor.

Hand crews securing the fire perimeter did not work in the riparian habitat. Hand crews walked the railroad tracks on the south side of the river and when actively burning spots were located, helicopter bucket drops were ordered to put out the hot spots.

STATUS OF THE SPECIES

The southwestern willow flycatcher is a small passerine bird (Order Passeriformes; Family Tyrannidae) measuring approximately 15 centimeters (5.75 in.) in length from the tip of the bill to the tip of the tail and weighing only 11 grams (0.4 ounces). It has a grayish-green back and wings, whitish throat, light gray-olive breast, and pale yellowish belly. Two white wingbars are visible (juveniles have buffy wingbars). The eye ring is faint or absent. The upper mandible is dark, the lower is light yellow grading to black at the tip.

The southwestern willow flycatcher is an insectivore typically perching on a branch and making short direct flights, or sallying, to capture flying insects. The southwestern willow flycatcher is a riparian obligate, nesting along rivers, streams, and other wetlands where dense growths of willow (*Salix* sp.), *Baccharis*, buttonbush (*Cephalanthus* sp.), boxelder (*Acer negundo*), saltcedar (*Tamarix* sp.) or other plants are present, often with a scattered overstory of cottonwood (*Populus* sp.) and/or willow.

One of four currently-recognized willow flycatcher subspecies (Phillips 1948, Unitt 1987, Browning 1993), the southwestern willow flycatcher is a neotropical migratory species that breeds in the southwestern U.S. and migrates to Mexico, Central America, and possibly northern South America during the non-breeding season (Phillips 1948, Stiles and Skutch 1989, Peterson 1990, Ridgely and Tudor 1994, Howell and Webb 1995). The historical range of the southwestern willow flycatcher included southern California, Arizona, New Mexico, western Texas, southwestern Colorado, southern Utah, extreme southern Nevada, and extreme northwestern Mexico (Sonora and Baja)(Unitt 1987).

The States of California and New Mexico list the southwestern willow flycatcher as endangered (California Department of Fish and Game 1992, and New Mexico Department of Game and Fish 1988). The state of Arizona considers the southwestern willow flycatcher a species of special concern (AGFD 1996). The Service included the southwestern willow flycatcher on its Animal Notice of Review as a category 2 candidate species on January 6, 1989 (USFWS 1989). A proposal to list the southwestern willow flycatcher as endangered, with critical habitat, was published on July 23, 1993 (USFWS 1993), and a final rule without critical habitat was published on February 27, 1995 (USFWS 1995), becoming effective on March 29, 1995. Following the review of comments received during the public comment period, the Service deferred the designation of critical habitat, invoking an extension on this decision until July 23, 1995. A moratorium on listing actions under the Act passed by Congress in April 1995 required the Service to cease work on the designation of critical habitat. On April 26, 1996, the moratorium was lifted and on May 16, 1996, the Service published a notice in the Federal Register announcing listing prioritization guidance. Listing actions were placed in categories of decreasing order of priority: Tier 1 - Emergency listings; Tier 2 - Finalization of listing decisions on proposed species; and Tier 3 - all other listing actions (proposed rules, petition findings, critical habitat designations). On May 13, 1997, the Southwest Center for Biological Diversity filed a lawsuit claiming that the Service violated the Act by not finalizing critical habitat for the southwestern willow flycatcher. On March

20, 1997, the District Court ordered the Service to finalize critical habitat for the flycatcher by July 18, 1997. The Department of Justice has filed an appeal and a stay pending appeal of the Court's decision. The Service is currently waiting for the Appeals Court's ruling.

Life History

The southwestern willow flycatcher forages within and above dense riparian vegetation, taking insects on the wing or gleaning them from foliage (Wheelock 1912, Bent 1960). No information is available on specific prey species. However, fecal samples containing identifiable invertebrate body parts were collected during banding operations from more than 70 southwestern willow flycatchers in California, Arizona, and southwestern Colorado (M. Sogge, pers. comm.). These samples could yield important data on prey use at various locations and timing throughout the breeding season.

The southwestern willow flycatcher begins arriving on breeding grounds in late April and May (Sogge and Tibbitts 1992, Sogge *et al.* 1993, Sogge and Tibbitts 1994, Muiznieks *et al.* 1994, Maynard 1995, Sferra *et al.* 1995). Migration routes are not completely known. However, willow flycatchers have been documented migrating through specific locations and drainages in Arizona that do not currently support breeding populations, including the upper San Pedro River (BLM, unpubl. data), Colorado River through Grand Canyon National Park (Sogge and Tibbitts 1992, Sogge *et al.* 1993, Sogge and Tibbitts 1994), lower Colorado River (Muiznieks *et al.* 1994, Spencer *et al.* 1996), Verde River tributaries (Muiznieks *et al.* 1994), and Cienega Creek (BLM, *in litt.*). These observations probably include subspecies *E.t. brewsteri* and *E.t. adastus*. *Empidonax* flycatchers rarely sing during fall migration, so that a means of distinguishing some migrating *Empidonax* without a specimen is not feasible (Blake 1953, Peterson and Chalif 1973). However, willow flycatchers have been reported to sing and defend winter territories in Mexico and Central America (Gorski 1969, McCabe 1991).

Nesting begins in late May and early June and young fledge from late June through mid-August (Willard 1912, Ligon 1961, Brown 1988, Whitfield 1990, Sogge and Tibbitts 1992, Sogge *et al.* 1993, Muiznieks *et al.* 1994, Whitfield 1994, Maynard 1995). Southwestern willow flycatchers typically lay three to four eggs in a clutch (range = 2-5). The breeding cycle, from laying of the first egg to fledging, is approximately 28 days. Eggs are laid at one-day intervals (Bent 1960, Walkinshaw 1966, McCabe 1991); they are incubated by the female for approximately 12 days; and young fledge approximately 12 to 13 days after hatching (King 1955, Harrison 1979). Southwestern willow flycatchers typically raise one brood per year but have been documented raising two broods during one season (Whitfield 1990). They have also been documented reneesting after nest failure (Whitfield 1990, Sogge and Tibbitts 1992, Sogge *et al.* 1993, Sogge and Tibbitts 1994, Muiznieks *et al.* 1994, Whitfield 1994, Whitfield and Strong 1995).

Whitfield, who has accumulated the largest data set on southwestern willow flycatchers, reported the following data on survivorship of adults and young: of 58 nestlings banded since 1993, 21 (36%) returned to breed; of 57 birds banded as adults (after hatch year) since 1989,

18 (31%) returned to breed at least one year (10 males, 8 females), five (9%) returned to breed for two years (all males), and two (3.5%) returned to breed for three years (M. Whitfield, Kern River Preserve, pers. comm.). Whitfield (1995) also documented statistically significant variation in return rates of juveniles as a function of fledging date; approximately 21.9% of juveniles fledged on or before July 20th returned to her study area the following year, whereas only 6.4% of juveniles fledged after July 20th returned the following year.

Walkinshaw (1966), who studied *E.t. traillii* in Michigan, estimated that 40.9% of the males at his study site returned to breed for at least two years, 22.7% returned for at least three years, 13.6% returned for at least four years, and at least 4.5% returned during their fifth year. Female return rates were substantially lower. Only 22.6% returned to breed for one year. Whitfield and Walkinshaw do not incorporate potential emigration rates into their estimates of returns and, thus, may underestimate actual survivorship. However, these data are consistent with survival rates for other passerines (Gill 1990, chap. 21) suggesting that the life span of most southwestern willow flycatchers is probably two to three years (i.e. most flycatchers survive to breed one or two seasons).

Brood parasitism of southwestern willow flycatcher nests by the brown-headed cowbird (*Molothrus ater*) has been documented throughout the flycatcher's range (Brown 1988, Whitfield 1990, Muiznieks *et al.* 1994, Whitfield 1994, Hull and Parker 1995, Maynard 1995, Sferra *et al.* 1995, Sogge 1995b). Cowbirds lay their eggs in the nests of other species directly affecting their hosts by reducing nest success. Cowbird parasitism reduces host nest success in several ways. Cowbirds may remove some of the host's eggs, reducing overall fecundity. Hosts may abandon parasitized nests and attempt to renest, which can result in reduced clutch sizes, delayed fledging, and reduced overall nesting success and fledgling survivorship (Whitfield 1994, Whitfield and Strong 1995). Cowbird eggs, which require a shorter incubation period than those of many passerine hosts, hatch earlier giving cowbird nestlings a competitive advantage over the host's young for parental care (Bent 1960, McGeen 1972, Mayfield 1977, Brittingham and Temple 1983). Where studied, high rates of cowbird parasitism have coincided with southwestern willow flycatcher population declines (Whitfield 1994, Sogge 1995a, Sogge 1995c, Whitfield and Strong 1995), or, at a minimum, resulted in reduced or complete elimination of nesting success (Muiznieks *et al.* 1994, Whitfield 1994, Maynard 1995, Sferra *et al.* 1995, Sogge 1995a, Sogge 1995c, Whitfield and Strong 1995). Whitfield and Strong (1995) found that flycatcher nestlings fledged after July 20th had a significantly lower return rate and that cowbird parasitism was often the cause of delayed fledging.

Habitat Use

The southwestern willow flycatcher breeds in dense riparian habitats from sea level in California to over 7000 feet in Arizona and southwestern Colorado. Throughout its wide geographic and elevational range, its riparian habitat can be broadly described based on plant species composition and habitat structure (Sogge *et al.* 1997). These attributes are among the most conspicuous components of flycatcher habitat, but not necessarily the only important

components. They are easily identified from photographs or during field visits and have been useful in conceptualizing, selecting, and evaluating suitable survey habitat. Photographs and accompanying text provided in Sogge *et al.* (1997) characterize the considerable variation in habitat structure and plant species composition found at breeding sites throughout the southwestern willow flycatcher's range. Two components that vary less across this subspecies' range are vegetation density and the presence of surface water. Those and other characteristics, such as size and shape of habitat patches, are described further below.

Based on the diversity of plant species composition and complexity of habitat structure, four basic habitat types can be described for the southwestern willow flycatcher. Those types are described below and should be referenced with photographs provided in Sogge *et al.* (1997). When reviewing the habitat descriptions below and applying them to a particular location in the field, keep in mind that characteristics of actual breeding sites fall somewhere on a continuum from monotypic to multiple plant species, and from a relatively simple habitat structure characterized by a single vegetation stratum to more complex habitat patches characterized by multiple-strata.

Monotypic willow: Nearly monotypic, dense stands of willow (often *S. exigua* or *S. geyeriana*) 3 to 7 m in height with no distinct overstory layer; usually very dense structure in at least lower 2 m; live foliage density is high from the ground to canopy.

Monotypic exotic: Nearly monotypic, dense stands of exotics such as saltcedar (*Tamarisk* sp.) or Russian olive (*Elaeagnus angustifolia*) 4 to 10 m in height forming a nearly continuous, closed canopy (with no distinct canopy layer); lower 2 m may be very difficult to penetrate due to branch density; however, live foliage volume may be relatively low from 1 to 2 m above ground; canopy density uniformly high.

Native broadleaf dominated: Comprised of dense stands of single species (often Goodding's or other willows) or mixtures of native broadleaf trees and shrubs including, but not limited to, cottonwood, willows, boxelder, ash, buttonbush, and stinging nettle from 4 to 15 m in height; characterized by trees of different size classes; may have distinct overstory of cottonwood, willow or other broadleaf species, with recognizable subcanopy layers and a dense understory of mixed species; exotic/introduced species may be a rare component, particularly in understory.

Mixed native/exotic: Dense mixtures of native broadleaf trees and shrubs (such as those listed above) mixed with exotic species such as tamarisk and Russian olive; exotics are often primarily in the understory, but may also be a component of overstory; the native and exotic components may be dispersed throughout the habitat or concentrated as a distinct patch within a larger matrix of habitat; overall, a particular site may be dominated primarily by natives, exotics, or be a more or less equal mixture.

There are other potentially important dimensions or characteristics of southwestern willow flycatcher habitat, including: size, shape, and distribution of vegetation patches; hydrology;

prey types and abundance; parasites; predators; environmental factors (e.g. temperature, humidity); and interspecific competition. Underlying these are factors relating to population dynamics, such as demography (i.e. birth and death rates, age-specific fecundity), the distribution of breeding groups across the landscape, flycatcher dispersal patterns, migration routes, site fidelity, philopatry, and degree of conspecific sociality (e.g. coloniality). Most of these attributes are not well understood for the southwestern willow flycatcher. However, some of these factors may be critical to understanding current population dynamics and habitat use. For example, characterizations of suitable breeding habitat may be significantly biased if observed patterns of habitat use are influenced by intrinsic dispersal patterns and capabilities rather than overall habitat quality.

Ultimately, habitat suitability should be measured in terms of reproductive success and survivorship that result in a positive rate of population growth. Without long term data that correlate or experimentally verify which combination of the above attributes contribute to population growth, habitat descriptions should be viewed broadly and considered descriptors of "suitable survey habitat."

The size and shape of occupied riparian habitat patches vary considerably. Southwestern willow flycatchers have been found nesting in patches as small as 0.8 ha (e.g. Grand Canyon) and as large as several hundred hectares (e.g. Roosevelt Lake, Lake Mead). When viewed from above, the mixed vegetation types in particular often appear as a mosaic of plant species and patch shapes and sizes. In contrast, narrow, linear riparian habitats one or two trees wide do not appear to contain attributes attractive to nesting flycatchers. However, flycatchers have been found using these habitats during migration.

Open water, cienegas, marshy seeps, or saturated soil are typically in the vicinity of flycatcher territories and nests; flycatchers sometimes nest in areas where nesting substrates were in standing water (Maynard 1995, Sferra *et al.* 1995, 1997). However, hydrological conditions at a particular site can vary remarkably here in the arid Southwest within a season and between years. At some locations, particularly during drier years, water or saturated soil is only present early in the breeding season (i.e. May and part of June). However, the total absence of water or visibly saturated soil has been documented at several sites where the river channel has been modified (e.g. creation of pilot channels), where modification of subsurface flows has occurred (e.g. agricultural runoff), or as a result of changes in river channel configuration after flood events (Spencer *et al.* 1996).

Nest placement and nesting substrate

Southwestern willow flycatcher nests are open cup structures, approximately 8 cm high and 8 cm wide (outside dimensions), exclusive of any dangling material at the bottom. Nests are typically placed in the fork of a branch with the nest cup supported by several

Table x1. Nest height and nest substrate height data by riparian habitat type for the southwestern willow flycatcher.

Habitat Type	n	Mean Nest Ht.		Mean Nest		Source
		Relative to Base of Nest Substrate [m] ± 1 STD (range)	Substrate Height [m] ± 1 STD (range)	Substrate		
				Height [m] ± 1 STD (range)		
Monotypic stands of Geyer willow (Apache Co., AZ)	33	1.8 ±0.3 (1.0 - 2.3)	4.4 ±0.5 (3.5 - 6.0)	Muiznieks <i>et al.</i> (1994), Sferra <i>et al.</i> (1995) Spencer <i>et al.</i> (1996, 1997)		
Mixed native broadleaf, predominantly Goodding's willow (Yuma Co., AZ)	28	2.1 ±0.8 (1.2 - 4.9)	-	H. Brown 1902 collections (T. Huels <i>in litt.</i>)		
Mixed native broadleaf (Kern Co., CA)	134	2.1 ±0.1 (0.6 - 10)	5.6 ±0.3 (1 - 14)	Whitfield and Strong (1995)		
Mixed native broadleaf/saltcedar (throughout AZ)	70	4.8 ±1.8 (1.5 - 10.5)	7.4 ±2.3 (3.5 - 17.0)	Muiznieks <i>et al.</i> (1994), Sferra <i>et al.</i> (1995) Spencer <i>et al.</i> (1996, 1997)		
Mixed native broadleaf/exotic (Grant Co., NM)	45	7.4 ±3.6 (2.0 - 14)	12.7 ±5.2 (4 - 28)	Skaggs (1995)		
Monotypic saltcedar (throughout AZ)	43	4.3 ±1.3 (2.7 - 8.0)	7.7 ±2.0 (3.4 - 12.0)	Muiznieks <i>et al.</i> (1994), Sferra <i>et al.</i> (1995) Spencer <i>et al.</i> (1996, 1997)		

small-diameter vertical stems. The main branch from which the fork originates may be oriented vertically, horizontally, or at an angle, and stem diameter for the main supporting branch can be as small as three to four cm. Vertical stems supporting the nest cup are typically one to two cm in diameter. Occasionally, southwestern willow flycatchers place their nests at the juncture of stems from separate plants, sometimes different plant species. Those nests are also characterized by vertically-oriented stems supporting the nest cup. Spencer *et al.* (1996) measured the distance between flycatcher nests and shrub/tree center for 38 nests in monotypic saltcedar and mixed native broadleaf/saltcedar habitats. In monotypic saltcedar stands ($n=31$), nest placement varied from 0.0 m (center stem of shrub or tree) to 2.5 m. In the mixed riparian habitat ($n=7$), nest placement varied from 0.0 to 3.3 m.

Nest height relative to the base of nest substrate also varies across the southwestern willow flycatcher's range and may be correlated with height of nest substrate and/or overall canopy height. Table x1 presents data on nest heights in different riparian habitat types across the flycatcher's range. Southwestern willow flycatcher nests have been found as low as 0.6 m above the ground to 14 m above the ground. The data presented in Table x1 demonstrate that flycatchers using predominantly native broadleaf riparian habitats nest relatively low to the ground (between 1.8 m and 2.1 m on average), whereas those using mixed native/exotic and monotypic exotic riparian habitats nest relatively high above the ground (between 4.3 m and 7.4 m on average).

Historic egg/nest collections and species' descriptions from throughout the southwestern willow flycatcher's range confirm the bird's widespread use of willow for nesting (Phillips 1948, Phillips *et al.* 1964, Hubbard 1987, Unitt 1987, T. Huels *in litt.* 1993, San Diego Natural History Museum 1995). Of the 34 nests found by Brown in 1902 near Yuma on the lower Colorado and Gila rivers, 33 were in Goodding's willow and one was in arrowweed. Data from historic egg collections from southern California and more current studies indicate that 75 to 80% of nests were placed in willows (San Diego Natural History Museum 1995). Currently, southwestern willow flycatchers use a wide variety of plant species for nesting substrates. At the monotypic willow stands that characterize high elevation sites in Arizona, Geyer willow was used almost exclusively for nesting (Muiznieks *et al.* 1994). At the inflow to Lake Mead on the Colorado River, Goodding's willow was the primary nesting substrate (R. McKernan unpubl. data). Along a 20-mile stretch of the Gila River in Grant County, New Mexico, where boxelder is the dominant understory species, 76% of flycatcher nests were placed in boxelder, with the remainder in Russian olive and saltcedar (Skaggs 1995). At the inflows of Tonto Creek and Salt River to Roosevelt Lake in Gila County, Arizona, both of which are comprised of monotypic stands of saltcedar, 100% of flycatcher nests were placed in saltcedar (Muiznieks *et al.* 1994, Sferra *et al.* 1995, Spencer *et al.* 1996). On the San Luis Rey River in San Diego County, California, approximately 90% of flycatcher nests were placed in live oak (*Quercus agrifolia*), which became the dominant plant species adjacent to the stream after willows were removed in the 1950s as a water conservation measure and a reservoir upstream reduced flood frequency and streamflow volume (W. Haas, San Diego Natural History Museum, pers. comm., 1995). Other plant species that southwestern willow flycatcher nests have been documented in include: buttonbush, black twinberry (*Lonicera involucrata*), Fremont cottonwood, white alder (*Alnus rhombifolia*), blackberry (*rubus ursinus*), Russian olive, and *S. hindsiana*.

Territory size

Southwestern willow flycatcher territory size, as defined by song locations of territorial birds, probably changes with population density, habitat quality, and nesting stage. Early in the season, territorial flycatchers may move several hundred meters between singing locations (Sogge *et al.* 1995, Petterson and Sogge 1996). It is not known whether these movements represent polyterritorial behavior or active defense of the entire area encompassed by singing locations. However, during incubation and nestling phases territory size or at least the activity centers of pairs can be very small and restricted to an area less than one-half hectare. Sogge *et al.* 1995 estimated a breeding territory size of 0.2 ha for a pair of flycatchers occupying a 0.6 ha patch on the Colorado River. Activity centers may expand after young are fledged but while still dependent on adults.

Distribution and abundance

Unitt (1987) noted that taxonomic confusion between *E. trailli* and *E. alnorum* (alder flycatcher) and among other *Empidonax* species that migrate through the southwestern U.S. probably accounted for the relative lack of research on the southwestern willow flycatcher. The alder and willow flycatchers, formerly known as Traill's flycatcher, were not officially recognized as separate species until the American Ornithologist's Union published its sixth edition Checklist of North American Birds (AOU 1983). The lack of systematic, rangewide collections of southwestern willow flycatchers preclude a complete description of this subspecies' former distribution and abundance. However, the more than 600 egg, nest, and specimen records available from museums throughout the U.S. in combination with state, county, and local faunal accounts from the first half of the 20th Century do indicate that, historically, the southwestern willow flycatcher was more widespread and, at least, locally abundant.

Phillips (1948) first described *E.t. extimus* from a specimen collected by Gale Monson on the lower San Pedro River near Feldman, AZ. The taxonomic validity of *E.t. extimus* was subsequently reviewed by Hubbard (1987), Unitt (1987), and Browning (1993), and has been accepted by most authors (e.g., Aldrich 1951, Behle and Higgins 1959, Phillips *et al.* 1964, Oberholser 1974, Monson and Phillips 1981, Harris *et al.* 1987, Schlorff 1990, Harris 1991). Unitt (1987) reviewed historical and contemporary records of *E.t. extimus* throughout its range, determining that it had "declined precipitously..." and that although the data reveal no trend in the past few years, the population is clearly much smaller now than 50 years ago, and no change in the factors responsible for the decline seem likely.

Overall, Unitt (1987) documented the loss of more than 70 breeding locations rangewide, including locations along the periphery and within core drainages that form this subspecies' range. Unitt estimated that, rangewide, the southwestern willow flycatcher population probably was comprised of 500 to 1000 pairs. Below is a state by state comparison of historic and current data for the southwestern willow flycatcher. Since 1992 more than 800 historic and new locations have been surveyed rangewide to document the status of the southwestern willow flycatcher (some sites in southern California have been surveyed since the late 1980s). Survey efforts in most states were

done under the auspices of the Partners in Flight program, which served as the coordinating body for survey training sessions and review and synthesis of data. The extensive and, in some cases, intensive nature of these efforts have provided a critical baseline for the current distribution, abundance, and reproductive success of southwestern willow flycatchers rangewide.

California

The historic range of southwestern willow flycatchers in California apparently included all lowland riparian areas in the southern third of the state. It was considered a common breeder where suitable habitat existed (Wheelock 1912, Willett 1912, 1933, Grinnel and Miller 1944). Unitt (1984, 1987) concluded that it was once common in the Los Angeles basin, the San Bernardino/Riverside area, and San Diego County. Specimen and egg/nest collections confirm its former distribution in all coastal counties from San Diego Co. to San Luis Obispo Co., as well as in the inland counties, Kern, Inyo, Mohave, San Bernardino, and Imperial. Unitt (1987) documented that the flycatcher had been extirpated, or virtually extirpated (i.e., few territories remaining) from the Santa Clara River (Ventura Co.), Los Angeles River (Los Angeles Co.), Santa Ana River (Orange and Riverside counties), San Diego River (San Diego Co.), lower Colorado River (Imperial and Riverside counties and adjacent counties in AZ), Owen's River (Inyo Co.), and the Mohave River (San Bernardino Co.). Its former abundance in California is evident from the 72 egg and nest sets collected in Los Angeles County, alone, between 1890 and 1912, and from Herbert Brown's 34 nests and nine specimens taken in June of 1902 from the lower Colorado river near Yuma. Local collections of this magnitude suggest that this subspecies was locally very abundant.

Survey and monitoring efforts since the late 1980s have confirmed the southwestern willow flycatcher's presence at 18 locations on 11 drainages in southern California (including Colorado River). Current known flycatcher breeding sites are restricted to three counties, San Diego, Riverside, Santa Barbara, and Kern. Combining survey data for all sites surveyed since the late 1980s for a composite population estimate, the total known southwestern willow flycatcher population in southern California is 114 territories (Table x2). Of the 18 sites where flycatchers have been documented, 72% (13) contain five or fewer territorial flycatchers; 22% (four sites) have single pairs, or unmated territorial birds. Only three drainages are known to have 20 or more flycatcher territories, the San Luis Rey River (San Diego Co.), South Fork Kern River (Kern Co.), and Santa Ynez River (Santa Barbara Co.).

Authorized (permitted) and unauthorized activities in riparian habitats continue to adversely affect occupied flycatcher habitat in southern California. For example, approximately one km of occupied habitat on the Santa Ynez River in Santa Barbara County was modified or completely eliminated in 1996 when expansion of agricultural fields resulted in clearing of riparian vegetation (USFWS *in litt.*). Despite the vast potential for riparian habitat and southwestern willow flycatcher recovery on Camp Pendleton in San Diego County, a programmatic section 7 consultation resulted in a conservation target of 20 southwestern willow flycatcher pairs (Table x3). The Base currently has approximately 22 pairs of flycatchers, in contrast to the 348 pairs of

Table x2. Rangewide population status for the southwestern willow flycatcher (based on composite of 1993-1995 survey data and 1996 survey data from lower Colorado River)¹.

	No. of Sites with Territories	No. of Drainages with Territories	No. of Sites (Drainages)			Total No. of Territories
			with ≤5 Territories	with 6-20 Territories	with >20 Territories	
New Mexico	19	8	16 (6)	2 (0)	1 (2)	173
Arizona	39	9	29 (4)	10 (4)	0 (2)	150
California	18	11	13 (8)	3 (1)	2 (3)	114
Colorado	6	5	6 (5)	0 (0)	0 (0)	13
Utah	2	1	2 (1)	0 (0)	0 (0)	2
Nevada	1	1	1 (1)	0 (0)	0 (0)	2
Texas	?	?	?	?	?	?
Total	85	35	67 (24)	15 (4)	3 (7)	454

¹ Based on surveys conducted at >800 historic and new sites in NM (Maynard 1995, Cooper 1996, Skaggs 1996); AZ (Sogge and Tibbitts 1992, Sogge *et al.* 1993, Muiznieks *et al.* 1994, Sogge and Tibbitts 1994, Sferri *et al.* 1995, Sogge 1995a, Sogge *et al.* 1995, Spencer *et al.* 1996, 1997, McKernan *in litt.*); CA (Camp Pendleton 1994, Whitfield 1994, Griffith and Griffith 1995, Holmgren and Collins 1995, Kus 1995, San Diego Natural History Museum 1995, Whitfield and Strong 1995, Griffith and Griffith 1996 *in litt.*); CO (T. Ireland 1994 *in litt.*, Stransky 1995); UT (McDonald *et al.* 1995, Sogge 1995b); NV (C. Tomlinson 1995 *in litt.*). Systematic surveys have not been conducted in Texas. For sites surveyed multiple years, highest single-year estimate of territories was used to tabulate status data. Tabulations do not include documented extirpations within survey period. Thus, individual state estimates and rangewide totals may be biased upward.

Table x3. Agency actions that have undergone section 7 consultation and levels of incidental take permitted for the southwestern willow flycatcher rangewide.

Action	Federal Year	Incidental Take	
		Agency ¹	Anticipated
Arizona			
Eastern Roosevelt Lake Watershed Allotment (Maricopa Co.)	1995*	Tonto NF	Indeterminable
Tonto Creek Riparian Unit (Maricopa Co.)	1995*	Tonto NF	Indeterminable
Cedar Bench Allotment (Yavapai Co.)	1995	Tonto NF	Indeterminable
Tuzigoot Bridge (Yavapai Co.)	1995*	NPS	None
Verde Valley Ranch (Yavapai Co.)	1995*	Corps	Loss of 2 flycatcher territories
Windmill Allotment (Yavapai Co.)	1995	Coconino NF	Loss of 1 flycatcher nest annually
Romero Road Bridge (Pinal Co.)	1995*	FEMA	Consultation in process
Glen Canyon Spike Flow (Coconino Co.)	1996	USBR	Adverse modification of proposed critical habitat
Solomon Bridge (Graham Co.)	1996*	FHWA	Loss of 2 territories
Modified Roosevelt Dam (Gila/Maricopa Co.)	1996*	USBR	Loss of 45 territories; reduced productivity/survivorship 90 birds
U.S. Hwy 93 Wickenburg (Mohave Co.)	1996*	FHWA	Consultation in process
Grazing on 13 Allotments (Pinal Co.)	1996	BLM	Consultation in process
Lower Gila Resource Plan Amend. (Yuma Co.)	1996	BLM	Consultation in process
Lower Colorado River Operations	1996*	USBR	Consultation in process
U.S. Forest Service Region 3 Forest Plans	1996	USFS	Consultation in process
Safford District Grazing Allotments	1996	BLM	Consultation in process
Virgin River Diversion/Fill (Mohave Co.)	1997	EPA	None
California			
Prado Basin, (Riverside/San Bernardino Co.)	1994	Corps	None
Orange County Water District (Orange Co.)	1995	Corps	None
Temescal Wash Bridge (Riverside Co.)	1995	Corps	Harm to 2 flycatchers
Camp Pendleton (San Diego Co.)	1995	DOD	Loss of 4 flycatcher territories
Lake Isabella Operations 1996 (Kern Co.)	1996*	Corps	Inundation 700 ac proposed critical habitat; reduced productivity 14 pairs
Lake Isabella Long-Term Operations (Kern Co.)	1997*	Corps	Consultation in process
Nevada			
Gold Properties Resort (Clark Co.)	1995	BIA	Harm to 1 flycatcher from habitat loss

Table x3 (continued).

Action	Federal Year	Agency ¹	Incidental Take Anticipated
New Mexico			
Corrales Unit, Rio Grande (Bernalillo Co.)	1995	Corps	None
Rio Puerco Resource Area	1996	BLM	Consultation in process
Farmington District Resource Management Plan	1996*	BLM	Consultation in process
Mimbres Resource Area Management Plan	1996*	BLM	Consultation in process

¹ BIA = Bureau of Indian Affairs; BLM = Bureau of Land Management; Corps = Army Corps of Engineers; DOD = Dept. of Defense; EPA = Environmental Protection Agency; FEMA = Federal Emergency Management Agency; FHWA = Federal Highway Administration; NF = National Forest; NPS = National Park Service; USBR = U.S. Bureau of Reclamation; USFS = U.S. Forest Service.

* Original proposed action determined to result in jeopardy to the flycatcher and/or adverse modification of proposed critical habitat.

the sympatric and endangered least Bell's vireo (*Vireo bellii pusillus*), which through the Base's conservation efforts increased from a low of 27 pairs in 1984. Army Corps of Engineers operations of Lake Isabella (Kern County) will result in long-term inundation of the 485-ha South Fork Wildlife Area, also proposed critical habitat for the flycatcher. The Wildlife Area represents a significant recovery area occupied by 8 to 10 pairs of flycatchers prior to inundation and lies downstream of one of California's largest southwestern willow flycatcher breeding groups on the Kern River Preserve.

Arizona

Historic records for Arizona indicate the former range of the southwestern willow flycatcher included portions of all major river systems (Colorado, Salt, Verde, Gila, Santa Cruz, and San Pedro) and major tributaries, such as the Little Colorado River and headwaters, and White River. Unitt (1987) noted that "probably the steepest decline in the population levels of *extimus* has occurred in Arizona." The bird has been extirpated, or virtually extirpated from the Santa Cruz River (Pima Co.), upper San Pedro River (Cochise Co.), lower San Pedro River at PZ Ranch (Pinal Co.), Blue River (Greenlee Co.), Colorado River at Lees Ferry (Coconino Co.), Colorado River (Yuma Co.), Gila River (Yuma Co.), and Verde River at Tuzigoot Bridge (Yavapai Co.). Currently, 150 territories are known from 39 sites along nine drainages statewide, including the Colorado River (Table x2). As in California, the majority of breeding groups in Arizona are extremely small; of the 39 sites where flycatchers have been documented, 74% (29) contain five or fewer territorial flycatchers. Moreover, 15 to 18% of all sites in Arizona are comprised of single, unmated territorial birds.

Permitted activities and stochastic events also continue to adversely affect the distribution and extent of occupied and potential breeding habitat throughout Arizona. For example, the Bureau of Reclamation is operating the new conservation space at Roosevelt Lake, which at capacity would totally inundate the riparian stands occupied by Arizona's largest breeding group (Table x3). As a result of Reclamation's operations on the lower Colorado River, the 445-ha Goodding's willow stand at the inflow to Lake Mead has been partially inundated since September 1995. Despite partial inundation, approximately eight pairs of flycatchers were documented nesting at the inflow during the 1996 breeding season. As of April 1997, inundation of that habitat was nearly complete. Reclamation (1996) projected the mortality of that stand sometime during 1997 as a result of prolonged inundation of root crowns (i.e. > two growing seasons).

In June of 1996, a catastrophic fire destroyed approximately one km of occupied habitat on the San Pedro River in Pinal County. That fire resulted in the forced dispersal or loss of up to 8 pairs of flycatchers (Paxton *et al.* 1996). In June of 1995, approximately three miles of occupied riparian habitat burned on the Gila River in Pinal County (Bureau of Land Management *in litt.*). It is not known how many flycatchers occupied that location. Approximately two km of riparian habitat burned in Graham County in the vicinity of Safford during 1996. It is not known whether that area was occupied by southwestern willow flycatchers; however, it did lie just downstream of an occupied patch that was partially eliminated by Solomon Bridge (Table x3). The anticipated effect

of construction of the Solomon Bridge was dispersal of flycatchers into adjacent habitat. The capability of adjacent habitat to absorb that dispersal was compromised by the fire near Safford.

New Mexico

Unitt (1987) considered New Mexico as the state with the greatest number of *extimus* remaining. After reviewing the historic status of the flycatcher and its riparian habitat in New Mexico, Hubbard (1987) concluded,

[it] is virtually inescapable that a decrease has occurred in the population of breeding willow flycatchers in New Mexico over historic time. This is based on the fact that wooded sloughs and similar habitats have been widely eliminated along streams in New Mexico, largely as a result of the activities of man in the area.

Unitt (1987), Hubbard (1987), and more recent survey efforts have documented extirpation or virtual extirpation in New Mexico on the San Juan River (San Juan Co.), near Zuni (McKinley Co.), Blue Water Creek (Cibola Co.), Rio Grande (Dona Ana Co. and Socorro Co.). Survey and monitoring efforts since 1993 have documented 173 flycatcher territories on eight drainages (Table x2). Approximately 135 of these territories occur in remnant strips of riparian forest within a 20-mile stretch of the Gila River in Grant Co (Skaggs 1995). This area contains the largest known breeding group rangewide. In a letter responding to proposed critical habitat for the flycatcher, this part of the Gila River is characterized as being contained by flood-control levees that do not support the regeneration of riparian trees such as willow and cottonwood. Thus, under existing conditions, habitat suitable for the southwestern willow flycatcher is not regenerating (Apker, et al. 1995) and this largest population may be lost as a result. Outside of Grant County few flycatchers remain. Statewide, 84% (16) of the 19 sites with flycatchers contain five or fewer territorial birds. Six sites are comprised of single pairs or unmated territorial flycatchers, and six others are comprised of two pairs or two unmated territorial birds.

Texas

The Pecos and Rio Grande rivers in western Texas are considered the easternmost boundary for the southwestern willow flycatcher. Unitt (1987) found specimens from four locations in Brewster, Hudspeth, and Loving counties where the subspecies is no longer believed to be present. Landowner permission to survey riparian areas on private property has not been obtained, thus current, systematic survey data is not available for Texas. There have been no other recent reports, anecdotal or incidental, of southwestern willow flycatcher breeding attempts in the portion of western Texas where they occurred historically. Given that surveys in adjacent Dona Ana County, New Mexico, have failed to document breeding along historically-occupied portions of the Rio Grande, the Service believes it is likely that the southwestern willow flycatcher has been extirpated from Texas.

Colorado

The taxonomic status and the historic distribution and abundance of willow flycatchers in southwestern Colorado remains unclear due to a lack of specimen data and breeding records. Preliminary data on song dialects suggests that the few birds recently documented in southwestern Colorado may be *E.t. extimus*. These sightings have prompted State and Federal agencies to delineate provisional boundaries for southwestern willow flycatchers and sponsor statewide survey efforts. Survey efforts since 1993 have documented a total of six locations in Delta, Mesa, and San Miguel counties where southwestern willow flycatchers have been found (Table x2). Two locations have single, unmated males; two locations have single pairs, and the remaining two locations are comprised of four to seven territories each.

On March 9, 1997 a fire started by an adjacent landowner burned a 32-ha portion of the Escalante Wildlife near Delta, Colorado. That location comprised one of the largest known breeding sites for southwestern willow flycatchers in Colorado with approximately seven pairs occupying the site in 1996.

Utah

Specimen data reveal that southwestern willow flycatcher historically occurred in southern Utah along the Colorado River, San Juan River, Kanab Creek, Virgin River, and Santa Clara River (Unitt 1987). Their northern boundary in south-central Utah remains unclear due to a lack of specimen data from that region. The southwestern willow flycatcher no longer occurs along the Colorado River in Glen Canyon where Lake Powell inundated historically-occupied habitat, nor in unflooded portions of Glen Canyon near Lee's Ferry where southwestern willow flycatchers were documented nesting in 1938. Similarly, recent surveys on the Virgin River and tributaries and Kanab Creek have failed to document their presence (McDonald *et al.* 1995). Single, territorial males and possibly a pair of southwestern willow flycatchers were documented at two locations on the San Juan River (San Juan Co.) in 1995, but breeding was not confirmed (Sogge 1995b). The population totals for Utah are summarized in Table x2.

Nevada

Unitt (1987) documented three locations in Clark County from which southwestern willow flycatchers had been collected, but not found after 1970. Current survey efforts have documented a single location with two unmated males on the Virgin River in Clark County (Tomlinson *in litt.*)(Table x2).

Rangewide, the current known population of southwestern willow flycatchers stands at approximately 454 territories (Table x2). These results indicate a critical population status; more than 75% of the locations where flycatchers have been found are comprised of five or fewer territorial birds and up to 20% of the locations are comprised of single, unmated individuals. The distribution of breeding groups is highly fragmented, with groups often separated by considerable distances (e.g., approximately 88 km straight-line distance between breeding flycatchers at

Roosevelt Lake, Gila Co., AZ, and the next closest breeding groups known on either the San Pedro River (Pinal Co.) or Verde River (Yavapai Co.)). Additional survey effort, particularly in southern California, may discover additional small breeding groups. However, rangewide survey efforts have yielded positive results in less than 10% of surveyed locations. Moreover, survey results reveal a consistent pattern rangewide: the southwestern willow flycatcher population as a whole is comprised of extremely small, widely-separated breeding groups or unmated individuals.

The data presented in Table x2 represents a composite of surveys conducted since 1992. Locations that had southwestern willow flycatchers for only one year were tabulated as if the location is still extant. Given that extirpation has been documented at several locations during the survey period, this method of analyses introduces a bias that may overestimate the number of breeding groups and overall population size. In addition, females have been documented singing as frequently as males. Because the established survey method relies on singing birds as the entity defining a territory (Tibbitts *et al.* 1994), double-counting may be another source of sampling error that biases population estimates upward. The figure of 454 southwestern willow flycatcher territories is an approximation based on considerable survey effort, both extensive and intensive. Given sampling errors that may bias population estimates positively or negatively (e.g., incomplete survey effort, double-counting males/females, composite tabulation methodology), natural population fluctuation, and random events, it is likely that the total population of southwestern willow flycatchers is fluctuating at between 300 and 500 territories with a substantial proportion of individuals remaining unmated. If all extant sites were fully protected, at such low population levels random demographic, environmental, and genetic events could lead to extirpation of breeding groups and eventually render this species extinct. The high proportion of unmated individuals documented during recent survey efforts suggests the southwestern willow flycatcher may already be subject to a combination of these factors (e.g., uneven sex ratios, low probability of finding mates in a highly fragmented landscape).

Southwestern willow flycatcher reproductive success

Intensive nest monitoring efforts in California, Arizona, and New Mexico have revealed that: (1) sites with both relatively large and small numbers of pairs have experienced extremely high rates of brood parasitism; (2) high levels of cowbird parasitism in combination with nest loss due to predation have resulted in low reproductive success and, in some cases, population declines; (3) at some sites, levels of cowbird parasitism remain high across years, while at others parasitism varies temporally with cowbirds absent in some years; (4) the probability of a southwestern willow flycatcher successfully fledging its own young from a nest that has been parasitized by cowbirds is low (i.e., < 5%); (5) cowbird parasitism and/or nest loss due to predation often result in reduced fecundity in subsequent nesting attempts, delayed fledging, and reduced survivorship of late-fledged young, and; (6) nest loss due to predation appears more constant from year to-year and across sites, generally in the range of 30 to 50%.

On the South Fork Kern River (Kern Co., CA), Whitfield (1993) documented a precipitous decline in the southwestern willow flycatcher breeding population from 1989 to 1993 (44 to 27 pairs).

Table x4. Nest predation and brood parasitism rates documented for the southwestern willow flycatcher across its range¹.

Location	Pre-1993	1993	1994	1995
S. Fork Kern River (Kern Co., CA)				
% nests parasitized ²	50 - 80	38*	16*	19*
% nests depredated	33 - 42	37	47	34
San Luis Rey River (San Diego Co. CA)				
% nests parasitized	-	-	0*	0*
% nests depredated	-	-	28	5
Colorado River (Coconino Co., AZ)				
% nests parasitized	≥ 50	100	44	100
% nests depredated	-	30	78	0
Verde River (Yavapai Co., AZ)				
% nests parasitized	-	100	50	extirpated
% nests depredated	-	100	50	
Little Colorado River (Apache Co., AZ)				
% nests parasitized	-	-	22	0
% nests depredated	-	-	33	28
Rio Grande (Socorro Co., NM)				
% nests parasitized	-	-	20	66
% nests depredated	-	-	40	60
Gila River (Grant Co., NM)				
% nests parasitized	-	-	-	16 - 27
% nests depredated	-	-	-	45

¹ Sources: Sogge and Tibbitts (1992), Sogge *et al.* (1993), Brown (1994), Maynard 1994, Muiznieks *et al.* (1994), Sogge and Tibbitts (1994), Cooper (1995), Skaggs (1995), Sogge (1995a), Sogge *et al.* (1995), Spencer *et al.* (1995), Whitfield and Strong (1995).

² Proportion of nests containing at least one brown-headed cowbird egg.

* Brown-headed cowbird control program implemented.

During that same period cowbird parasitism rates between 50 and 80 percent were also documented (Whitfield 1993) (Table x4). A cowbird trapping program initiated in 1993 reduced cowbird parasitism rates to $< 20\%$. Southwestern willow flycatcher population numbers appear to have stabilized at 32 to 34 pairs in 1993, 1994, and 1995 (Whitfield 1994, Whitfield and Strong 1995). Predation rates have remained relatively constant in the range of 33 to 47% (Table x4). Southwestern willow flycatcher nest success increased from 26% prior to cowbird trapping to 48% after trapping was implemented (Whitfield and Strong 1995). In addition, the number of young fledged also increased from 1.01 young/pair to 1.73 young/pair during the same period.

Whitfield and Strong (1995) found that, besides lowering nest success, fecundity, and the number of young produced, cowbird parasitism may also lower survivorship of southwestern willow flycatcher young fledged late in the season. Southwestern willow flycatchers that abandon parasitized nests or renest after fledging cowbirds lay fewer eggs in subsequent clutches and, if successful, fledge young late in the season. Whitfield and Strong determined that cowbird parasitism delayed successful southwestern willow flycatcher nesting by at least 13 days and this delay resulted in significantly different return rates of juveniles. Only 6.4% of southwestern willow flycatcher young that came from late nests were recaptured in subsequent years, whereas 21.9% of young that came from early nests were recaptured. If these recapture rates mirror actual survivorship, then even though some parasitized southwestern willow flycatchers eventually fledge their own young, nest loss due to parasitism or depredation may have the more insidious effect of reducing overall juvenile survivorship. Despite the cowbird trapping program and increased reproductive success, Whitfield has not observed a population increase at her study area. Whitfield and Strong (1995) speculate that other factors in addition to cowbird parasitism, such as habitat loss and pesticide use on wintering grounds and/or stochastic events such as storms resulting in mortality, may be keeping population numbers low.

The number of unmated, territorial, and paired southwestern willow flycatchers detected on the Colorado River in the Grand Canyon has remained low since monitoring began in 1982. Brown (1994) reported that at least 50% of the southwestern willow flycatcher nests monitored in the Grand Canyon between 1982 and 1987 were parasitized by brown-headed cowbirds. Brown (1994) did not report data on productivity. Given that the probability of successfully fledging a single chick is low when a nest is parasitized and the high proportion of nests parasitized during Brown's study, it is likely that southwestern willow flycatcher productivity during that period was also low. In 1992, when comprehensive nest monitoring was initiated, two pairs were present, with only one establishing a nest. That nest successfully fledged three chicks (Sogge and Tibbitts 1992). In 1993, one breeding pair, one male with two females, and six unpaired males were detected. Three nests were found, all of which were parasitized by brown-headed cowbirds (Table x4). No southwestern willow flycatchers were successfully reared in Grand Canyon in 1993 (Sogge *et al.* 1993). Four pairs and one unpaired male occupied Grand Canyon in 1994. Nine nests were attempted, at least four of which were parasitized by cowbirds. All nesting attempts eventually failed due to predation or abandonment (Sogge and Tibbitts 1994). In 1995, one breeding pair and three unpaired males were detected (Sogge *et al.* 1995). One nest was found with a single cowbird egg on May 23. On June 4, three southwestern willow flycatcher eggs were present, but the cowbird egg was missing. That nest successfully fledged one chick. In summary, since 1992, 10

known pairs of southwestern willow flycatchers have made 14 nesting attempts in the Grand Canyon, two of which successfully fledged a total of four chicks. This low rate of reproduction indicates that, even with the protections provided annually by the National Park Service (i.e., camping and other activities are prohibited at southwestern willow flycatcher breeding sites), this area is a population sink (Pulliam 1988) where reproduction is not adequate to replace adults and population persistence requires emigration from other breeding areas.

On the Verde River in Yavapai Co., AZ, Ohmart (pers. comm.) discovered four pairs of southwestern willow flycatchers in 1992 at Clarkdale. The breeding status and reproductive success of those birds was not determined. In 1993, two pairs were present and one nest was documented. The nest contained a single cowbird nestling and eventually failed (Muiznieks *et al.* 1994) (Table x4). In 1994, two pairs and one unpaired male were present. Two nests were found, one of which successfully fledged two chicks, the other fledged a single cowbird (Sferra *et al.* 1995). Data from a more limited monitoring effort in 1995 indicate that two unpaired males occupied the Clarkdale site (Sogge 1995a). Surveys during the 1996 breeding season failed to detect any southwestern willow flycatchers at the Clarkdale site. However, one nesting pair was discovered at Tavasci Marsh approximately 2.4 km east of the Clarkdale site. Thus, although since its discovery the Clarkdale site has had only several pairs, cowbird parasitism and nest loss due to depredation resulted in poor reproductive success and may have been responsible for abandonment or extirpation at this site.

Elsewhere in Arizona, population loss or undetected dispersal of breeding groups has been documented since 1993. For example, surveys in 1993 estimated five territorial males at Dudleyville Crossing on the San Pedro River (Pinal Co.). However, surveys in 1994 and 1995 failed to detect any southwestern willow flycatchers at that location (Muiznieks *et al.* 1994, Sferra *et al.* 1995, Spencer *et al.* 1996). Southwestern willow flycatchers detected in 1993 at Soza Wash on the San Pedro River were not detected in follow-up surveys in 1995, and an individual observed at Ister Flat on the Verde River was not detected in follow-up surveys during 1994. It is not known whether these events represent mortality of southwestern willow flycatchers, changes in habitat quality, or simply a vagile tendency inherent to this species. At other locations on the San Pedro River in Pinal Co., such as Cook's Lake and PZ Ranch, southwestern willow flycatcher breeding group size has remained stable. However, in 1996 a catastrophic fire destroyed much of the breeding habitat at PZ Ranch resulting in nest loss, abandonment of that site and, perhaps, mortality of adults (Paxton *et al.* 1996).

On the Little Colorado River in Apache Co., AZ, a cowbird parasitism rate of 22% was documented in 1994 (Table x4). In 1995 the parasitism rate was zero. Nest loss due to depredation, however, remained relatively constant (Table x4). On the Rio Grande in Socorro Co., NM, parasitism rates increased from 20% in 1994 to 66% in 1995. In 1996, water was diverted above that breeding location and no southwestern willow flycatchers were present (D. Leal, pers. comm.). It is not known whether those birds dispersed elsewhere or if that breeding group was extirpated. Finally, on the Gila River in Grant Co., NM, Skaggs (1995) monitored 46 nests from a breeding group of approximately 135 pairs. From a subset of 25 nests

whose contents were checked directly or inferred through observation, Skaggs estimated a cowbird parasitism rate of between 16 and 27% for 1995 (Table x4).

The data presented above and in Table x4 demonstrate that cowbird parasitism and nest depredation are affecting southwestern willow flycatchers throughout their range. Cowbirds have been documented at more than 90% of sites surveyed (Sogge and Tibbitts 1992, Sogge *et al.* 1993, Camp Pendleton 1996, Muiznieks *et al.* 1994, Sogge and Tibbitts 1994, T. Ireland 1994 *in litt.*, Whitfield 1994, C. Tomlinson 1995 *in litt.*, Griffith and Griffith 1995, Holmgren and Collins 1995, Kus 1995, Maynard 1995, McDonald *et al.* 1995, Sferra *et al.* 1995, Sogge 1995a, Sogge 1995b, Sogge *et al.* 1995, Cooper 1996, San Diego Natural History Museum 1995, Stransky 1995, Whitfield and Strong 1995, Griffith and Griffith 1996 *in litt.*, Skaggs 1995, Spencer *et al.* 1996). Thus, the potential for cowbirds to be a persistent and widespread threat remains high. Cowbird trapping has been demonstrated to be an effective management strategy for increasing reproductive success for the southwestern willow flycatcher as well as for other endangered Passerines (e.g., least Bell's vireo [*Vireo bellii pusillus*], black-capped vireo [*V. atricapillus*], golden-cheeked warbler [*Dendroica chrysoparia*]). It may also benefit juvenile survivorship by increasing the probability that parents fledge birds early in the season. Expansion of cowbird management programs has the potential to not only increase reproductive output and juvenile survivorship at source populations, but also to potentially convert small, sink populations into breeding groups that contribute to population growth and expansion.

Nest loss due to predation is common among small Passerines. The rates documented for southwestern willow flycatchers are also typical for small Passerines (i.e., rates < 50%). However, even at these "typical" levels nest loss due to predation is a significant factor contributing to low reproductive success. Nest predation presents a difficult management challenge because of the variety of taxa involved and the difficulty in developing an effective management plan for more than one taxon. Until specific predators on southwestern willow flycatcher nests are identified, measures to reduce potential predator populations should focus on reducing human activities that attract predators, such as camping, picnicking, etc. where pets are loose and refuse is concentrated.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all Federal, State, or private actions in the action area, the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation, and the impact of State and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Within the proposed project area, suitable and potential southwestern willow flycatcher nesting habitat exists. This habitat is provided by areas of riparian shrubs and trees, chiefly willow, cottonwood, boxelder, ash, and tamarisk. These areas are distributed discontinuously along the Gila River, sometimes adjacent to the main river channel and sometimes several hundred feet

away. These habitat areas are not only important for recovery, but, as indicated by recent sighting both upstream and downstream of the proposed project area, have potential to be currently supporting southwestern willow flycatchers. Southwestern willow flycatchers are known to occupy numerous habitat patches of riparian vegetation along the Gila River in the vicinity of the White Canyon fire. The river corridor above Cochran was surveyed by BLM biologists during the week prior to the start of the fire. Up until this time, the Gila River in this area was considered potential southwestern willow flycatcher habitat but had no records of these birds occurring in the area. Figure 1 illustrates the locations of known southwestern willow flycatcher habitat patches, the number of birds recorded at each patch and the locations of designated helicopter bucket dip sites.

Beaver, which in the early 1800's were abundant in the San Pedro and Gila Rivers and probably defined much of the aquatic and riparian habitats, were extirpated. Roads, mining, livestock grazing, agriculture, water diversion, wood harvesting, and groundwater pumping have caused erosion, channel downcutting, sedimentation, riparian vegetation changes, stream channel alteration, pollution, and almost total dewatering of the river. The Gila River, which was historically a moderate-sized perennial river, now flows perennially to the schedule of operations of Coolidge Dam on the San Carlos Apache Reservation.

The Gila River continues to undergo adverse effects from Federal, state, and private actions, including new and long-term ongoing actions in the project area. Development in the bottomlands or floodplains also eliminates portions of the natural riparian areas. Changes to the river channel that affect how base flow and flood currents move downstream and across the floodplain have effects on patterns of erosion, aggradation, and maintenance or regeneration of riparian vegetation. Erosion that forms tall, steep banks may prevent the flooding of adjacent floodplains and cause changes to the height of the water table. Placement of fill in the floodplain or other actions that constrict, redirect, or change velocity of flow may result in changes in sediment deposition and erosion upstream and downstream. Riparian vegetation may be lost if the water table moves below the level their roots can reach.

The above activities have reduced the quantity of suitable habitat for the southwestern willow flycatcher, through reduction of riparian vegetation and surface water, changes in channel morphology, and other factors. Within the immediate project area, however, riparian vegetation develops well, in patches, after floods and when flows are adequate. A consultation with BLM, in progress, addresses cattle grazing management on allotments within and beyond the project area. BLM intends to manage the riparian through exclusion of cattle grazing in cooperation with the range users and develop some level of brown-headed cowbird management.

Effects of the fire (emergency):

The effects of wildfire on occupied southwestern willow flycatcher habitat have not been well documented. The obvious impacts of fire on nesting birds are direct loss of habitat and nests by burning. This habitat would be lost for at least several years depending on adequate river flows to trigger regeneration of habitat and nest trees. The adult birds would likely survive and may attempt to nest again in the same year in a different habitat patch. There is no shortage of suitable

unoccupied habitat along the Gila River in the vicinity of the fire. The adult birds may not nest again until next year in which case one year's recruitment is lost. Smoke and heat from fires burning near a nest site but not destroying the nest tree would likely disturb and may kill young birds in the nest. Again the adults may attempt another clutch of eggs or wait until the following year.

The White Canyon fire totally destroyed one southwestern willow flycatcher habitat patch occupied by at least three birds. Three other habitat patches were likely impacted by the fire from smoke and flames burning immediately adjacent to the patch edge. These three patches were occupied by at least 15 adult southwestern willow flycatchers. BLM biologists conducted surveys on June 28-30, 1995, starting in the burn area and proceeding downstream. Four adult southwestern willow flycatchers were recorded using habitat immediately adjacent to the burned area. Sixteen more adult birds were documented using habitat within 1/2 mile downstream of the burned area.

EFFECTS OF THE ACTION

Effects of suppression actions (response):

BLM contacted the Service to discuss ways to avoid effects to the southwestern willow flycatcher to the extent possible. The Service provided the following: use water from unoccupied areas, keep helicopters as far from occupied habitat patches as possible, and set no backfires, if possible. Air tanker retardant drops in and along the river corridor likely disturbed nesting southwestern willow flycatchers. The retardant is dropped from low flying large airplanes. Fire retardant is an ammonium based chemical containing nitrogen, phosphorous and a corrosion inhibitor composed of sodium ferrocyanide. Retardant is known to be toxic to aquatic life in relatively high concentrations. Heavy air tanker retardant drops would likely result in nest abandonment if the drop hit a nest tree. The Gila River was flowing at a rate in excess of 1000 cubic feet per second. It is unlikely that the chemical affects of the retardant would have any significant affect on the water quality or any aquatic life due to dilution from river flows during and after fire suppression actions.

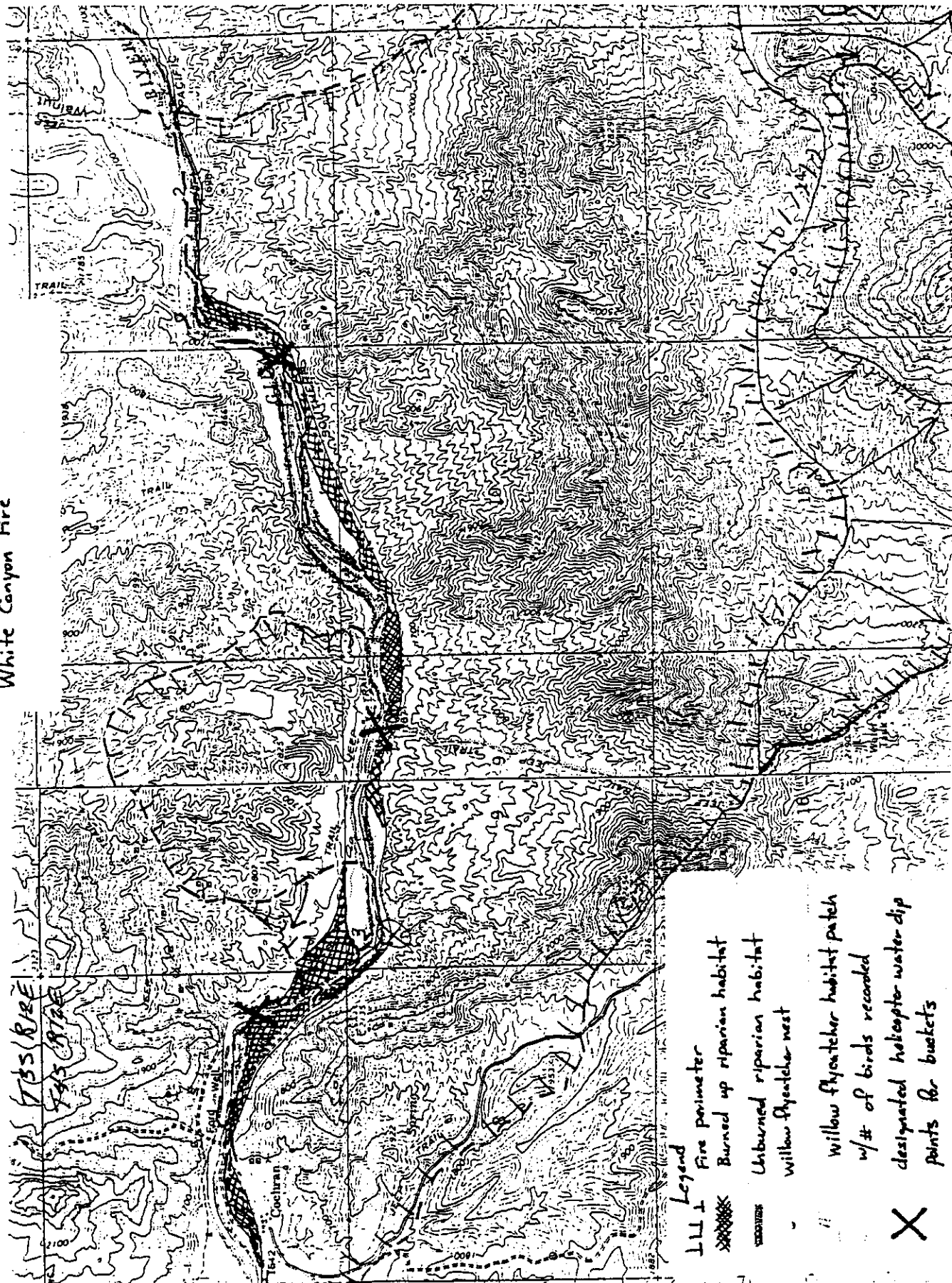
Low flying helicopters in the vicinity of occupied southwestern willow flycatcher habitat patches may have disturbed or displaced birds and may have led to nest abandonment. Efforts were made to limit this impact by locating dip sites away from known occupied habitat patches and in areas destroyed by fire, pilot education and minimizing flight time along the river corridor.

In all of the above disturbances, the adult birds would likely survive and may attempt to nest again in the same year, in the same or a different habitat patch. There is no shortage of suitable unoccupied habitat along the Gila River in the vicinity of the fire. The adult birds may not nest again until next year in which case, one year's recruitment is lost.

The fire suppression activities (air tanker retardant drops, low flying helicopters, helicopters dipping water from the river) all had the potential for disturbing nesting southwestern willow flycatchers. These impacts are very difficult to quantify but in worst case scenario may result in

Figure 1.

White Canyon Fire



the loss of recruitment from 18 adult birds for one year. These same birds were likely impacted by the fire already. Differentiating between fire and fire suppression impacts to the birds is impossible. Had the fire suppression activities not been conducted, the fire would likely have continued to consume riparian vegetation upstream including three additional southwestern willow flycatcher habitat patches occupied by at least 16 additional adult birds.

CUMULATIVE EFFECTS

The action area is primarily public land managed by BLM. The ongoing private or State actions described in the environmental baseline will continue in the action area. Any other flood control or bank stabilization work in the Gila River could require a Clean Water Act, section 404 permit to proceed, and thus is likely to have a Federal connection.

Increasing development along the Gila and San Pedro Rivers may have significant effects on the southwestern willow flycatcher. Effects may be direct on individuals, or effects on habitat. Increases or changes in the types of potential cowbird foraging sites (*e.g.* bird feeders, corrals, stockyards) may increase the potential for cowbird parasitism of local flycatchers. Construction within the 100-year floodplain could destroy or adversely modify proposed critical habitat. Increased recreational use of the river floodplains, particularly by off-highway vehicles or river floaters, may also adversely modify proposed critical habitat.

CONCLUSION

After reviewing the current status of the southwestern willow flycatcher, the environmental baseline for the action area, the effects of the emergency fire suppression activity, and the cumulative effects, it is the Service's biological opinion that the fire suppression, as conducted, is not likely to jeopardize the continued existence of the southwestern willow flycatcher. No critical habitat has been designated for this species, therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Sections 4(d) and 9 of ESA, as amended, prohibit taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or the applicant. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part

of the agency action is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be implemented by the agency so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply. The BLM has a continuing duty to regulate the activity covered by this incidental take statement. If the BLM (1) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

AMOUNT OR EXTENT OF TAKE

The Service anticipates four pair of southwestern willow flycatchers were taken as a result of this proposed action. The incidental take is expected to be in the form of harassment for one pair of birds each at two habitat patches which were within several hundred yards of water bucket fill sites, and two pair were taken through harassment from water drops at two habitat patches that were burning. Although birds were lost from the fire, it is unlikely that take in the form of harm or killing occurred because of the careful suppression measures.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURES

The Service provided BLM with reasonable and prudent measures for minimizing take of the southwestern willow flycatcher: use water from unoccupied areas, keep helicopters as far from occupied habitat patches as possible, and set no backfires, if possible. As BLM incorporated all reasonable and prudent measures to reduce incidental take into their emergency suppression action, no reasonable and prudent measures or terms and conditions are given here. The requirements for exemption from the taking provisions of section 9 of the Act have been met.

To the extent that this statement concludes that take of any threatened or endangered species of migratory bird will result from the agency action for which consultation is being made, the Service will not refer the incidental take of any such migratory bird for prosecution under the MBTA of 1918, as amended (16 U.S.C. §§ 703-712), or the Bald Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of ESA directs Federal agencies to utilize their authorities to further the purposes of ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

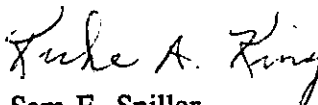
- Preclude riparian areas from grazing activities after fire for two growing seasons.
- Block up riparian habitat in the Middle Gila drainage in Federal ownership.
- Remove limiting factors to southwestern willow flycatcher occupation and productivity in riparian areas.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the action(s) outlined in the (request/reinitiation request). As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

For further information please contact Ted Cordery or Angie Brooks. Please refer to the consultation number 2-21-95-F-356, in future correspondence concerning this project.


for Sam F. Spiller

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM
State Director, Bureau of Land Management, Phoenix, AZ

Director, Arizona Game and Fish Department, Phoenix, AZ

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